(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 714 736 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
05.06.1996 Bulletin 1996/23

(51) Int Cl.[6]: **B26B 13/00**

(21) Application number: **95308447.2**

(22) Date of filing: **24.11.1995**

(84) Designated Contracting States:
DE DK ES FR GB IT

(30) Priority: **29.11.1994 GB 9424070**

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(54) A foldable hand tool

(57) The invention relates to a hand tool and in particular a cutting implement such as a pair of pruning secateurs having a fixed handle (2) housing a pair of blades (5, 6) and a movable handle (3) all pivotally connected about a common axis (4), so that rotation of the moveable handle causes the blades (5, 6) to rotate out of the fixed handle (2) to a cutting position, and in its final position causes a cutting action of the blades (5, 6). The moveable handle (3) is rotated by at least 90 degrees before the blades are engaged and subsequently pivoted from the housing by further rotation of the movable handle and has an arc shaped cut-out (9) engaging projecting a pin (8) at least one of the blades (5, 6) to cause

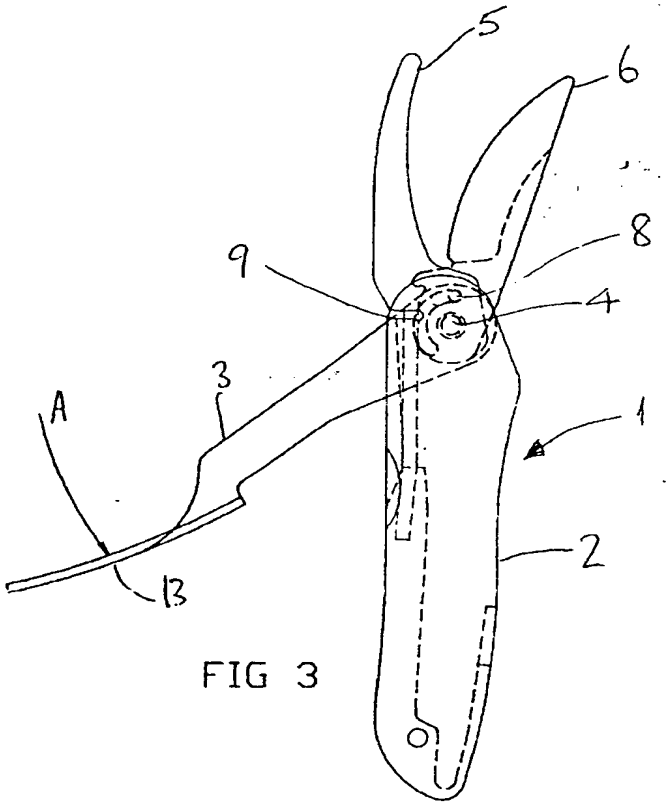

FIG 3

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Description

The invention relates to a foldable hand tool such as cutting implements such as secateurs, nail clippers, scissors or to household or garden shears.

At present, such cutting implements are awkward to carry around because of exposure of the cutting blades. Further, many such implements are bulky and heavy and thus awkward to carry. For example there are many instances where gardeners find themselves in a position where they would like to prune bushes but do not have a pair of secateurs at hand. Similarly users of other cutting implements find themselves in locations where the cutting implement is required but is not readily to hand.

It is hazardous to carry cutting implements while carrying out other tasks and it is also dangerous to insert the cutting implements in a pocket or to hang the cutting implement from one's person, for example from a belt to free the hands for other tasks. The user will therefore inevitably deposit the hand tool or cutting implement on the ground or on a surface and it will be lost or inaccessible when it is next required to be used.

Various devices have been developed in the prior art to overcome this problem. A sheath for example could be used to protect the cutting edges of operating parts of the hand tool to protect them from causing injury whilst the hand tool is placed in a pocket or hung from one's person. The main disadvantage of this proposal however is that the cover cap can easily remove itself and will invariably become lost.

GB-A-212315 discloses a tool which comprises a hand foldable case and the blades are exposed for used by a sliding action. This sliding action moves the pivot axis of the blades from the rear of the body to the front of the body where the blades can be opened and closed by means of handle parts acting on springs. The main disadvantage of this device is that the pivoting axis has to be slidably moved. This makes it vary difficult to restrain the pivot axis sufficiently in the working position. During cutting or other working operation considerable forces are transmitted through the pivot axis and this will inevitably lead to failure of the device because of the inability to restrain the pivot sufficiently while also permitting it to be manually moved.

The invention is directed towards providing a hand tool to overcome these problems.

According to the invention a hand tool is provided having a fixed handle which houses first and second blades and a movable handle all pivotally connected about a common axis, the blades and moveable handle being interconnected so that rotation of the moveable handle in a first direction causes the blades to rotate out of the fixed handle to an operating position and so that further rotation of the moveable handle in the same first direction causes a cutting action of the blades.

Also according to the invention a hand tool is provided, said hand tool being a cutting implement, having a fixed handle which houses first and second blades said first and second blades being movable with respect to each other and crossing each other in a cutting action, and a movable handle; all pivotally connected about a common axis, the blades and moveable handle being interconnected so that rotation of the moveable handle in a first direction causes the blades to rotate out of the fixed handle to an operating position and so that further rotation of the moveable handle in the same first direction causes a cutting action of the blades.

Preferably the moveable handle is rotated by at least 90 degrees before the blades are engaged and subsequently pivoted from the housing by further rotation of the movable handle.

Preferably the movable handle has an arc shaped cut-out engaging projecting a pin at least one of the blades to permit pivoting movement of the moveable handle with respect to the blades. When the moveable handle has been pivoted out of the fixed handle the end of the arc shaped cut-out engages the pin causes further rotational movement of the moveable handle to result in corresponding pivoting of the blades our of the fixed handle.

Preferably the hand tool includes at least one leaf spring to assist in urging of the blades into the operating position in which the said one of the blades is fixed with respect to the fixed handle in a detented action. A cam surface on the first blade co-operates with the corresponding surface of the leaf spring to urge the first blade in its fixed position.

Preferably the second blade is movable in the operating position with respect to the first blade between open and closed positions by the operation of the user of the moveable handle and a leaf spring urges the second blade into the open position. The second blade preferably comprises the pin and the first blade comprises an elongate slot which limits the movement of the second blade in the open position.

The blades may be returned to a non operating position inside the fixed housing by rotation of the moveable handle in a second direction being opposite to the first direction. The moveable handle comprises a lateral extension to engage the blades.

Preferably the leaf springs urge the first and second blades into the non-operating position inside the fixed handle.

Preferably in the non-operating position the movable handle fits into the fixed handle such that the lateral extension may easily be gripped for the pivoting out of the moveable handle.

According to a further embodiment of the invention the first and second blade may be urged into their respective positions by means of a torsion spring.

The invention will be more clearly understood from the following description of some embodiments therefor, given by way of example only, of a pair of secateurs with reference to the accompanying drawings in which:

Fig. 1 is a diagrammatic front view of a pair of secateurs of the invention when folded up,

Fig. 2 is a side view showing the secateurs when partially opened,

Fig. 3 is a side view showing the secateurs in the cutting position,

Fig. 4 is a longitudinal cross section showing one of the blades,

Fig. 5 is a longitudinal cross section showing the other blade,

Fig. 6 is a side view showing the secateurs during the cutting action,

Fig. 7 is a cross section through the pivot of the secateurs showing a threaded assembly,

Fig. 8 is a cross section through the pivot of the secateurs showing a riveted assembly,

Fig. 9 is a side elevation of the moveable handle component of the secateurs shown on its own,

Fig. 10 is a front elevation of the moveable handle of fig. 9.

Referring to the drawings, and initially to figs. 1 to 6 inclusive, there is illustrated a pair of secateurs of the invention, indicated generally by the reference 1. The secateurs 1 comprise a fixed handle 2 which acts as a housing for the various parts in a similar manner to the housing for a pen knife. The fixed handle 2 contains a movable handle 3 which projects from the fixed handle 2 so that it may be easily gripped for opening of the secateurs. The movable handle is pivotally connected to the fixed handle 2 by a pivot pin 4. A pair of blades, namely a concave blade 5 and a convex blade 6 are also housed within the fixed handle 2 and are pivotally connected at the pivot pin 4. As shown in detail in Figs. 3 to 6, the concave blade 5 includes a slot 7 for engagement with a projection 8 on the convex blade 6. The moveable handle 3 includes an arc shape cut out 9 within which runs the projection 8 on the convex blade 6. Leaf spring 11, 11a are mounted on the fixed handle 2 and act on the blades 5 and 6.

The movable handle 3 includes a projecting gripping means 13 to enable the user to grip the movable handle and rotate it out of the fixed handle 2.

In use, the secateurs 1 may be carried about and folded up as shown in fig. 1. When the secateurs are to be used, the movable handle 3 is gripped by the gripping means 13 and is rotated out of the fixed handle 2 as shown in fig. 2, in the direction of arrow A. At a certain point of rotation at the position shown in figure 2 the concave blade 5 is pulled out automatically by engagement of the projecting pin 8 with the cut-out 9 of the moveable handle 3. This in turn causes the convex blade 6 to be pulled out of the fixed handle housing 2 by engagement of the pin 8 with the slot 7. On further rotation of the movable handle 3 as shown in fig. 3, the concave blade 5 reaches its extreme position where further rotation is prevented by the action of the leaf spring 11a. As the concave blade 5 approaches its operating position it is urged into this position by the action of the leaf spring 11a. A cam surface 12 of the lower part of concave blade 5 co-operates with a corresponding surface of the leaf spring 11a to urge the concave blade 5 into the fixed operating position and the leaf spring 11a also fixedly retains the concave blade 5 in this fixed position by this urging action.

The convex blade 6 has reached its cutting position at this stage. It will be noted that the movable handle 3 has rotated approximately 300 degrees at this stage. On still further rotation of the movable handle 3 to the position of approximately 330 degrees as shown in fig. 6, in the direction of arrow B, the convex blade 6 is urged towards the concave blade 5 in a cutting action against pressure of the leaf spring 11. The cutting arc of the convex blade 6 is stopped by the pin 8 engaging in the slot 7. During this cutting action, the concave blade 5 remains in the locked position and on release of pressure on the movable handle 3, the handle moves back to its 300 degree position for cutting action.

When cutting is completed the movable handle 3 may be rotated back into its non-operating position and this in turn causes the blades to retract into the fixed handle 2. The lateral extension 13 of the movable handle 3 engages the blades 5, 6 causing them to retract with it into the fixed handle 2. The leaf springs 11, 11a engage against the blades 5, 6 urging them in the non-operating position inside the fixed handle 2.

Referring to figures 7 and 8 the arrangement of the parts form the construction of the secateurs can readily be seen. The fixed handle 2 comprises two separate parts 2a and 2b which are sandwiched together by means of the rivets or bolts 4, 4a with the moving parts between them to form the secateurs 1. Starting from the left side of the secatteurs 1 of figure 7 the arrangement comprises a spring washer 19 against which the moving handle 3 is arranged, against which the fixed concave blade 5 is arranged against which the movable convex blade 5 is arranged which is itself arranged against the other side of the fixed handle 2b. The fixed handle 2 may also comprise a hollow space for the inclusion of additional tools for example a knife or any other useful implement.

The end cross sections of the leaf springs 11, 11a can be seen acting against the blades 5, 6. The leaf springs 11, 11a are supported to the fixed handle part to approximately one third of the way along the fixed handle starting from the remote end such that the free ends of the leaf springs are free to move and act against the blades 5, 6 in the urging manner described above.

In figure 7 the pin 4 comprises a bolt 18 which is connected by means of a thread to a nut 15. A bearing bush 16 is provided between the bolt and the moving parts 3, 5, and 6.

Referring to figure 8 in an alternative embodiment the pin 4 is comprised of a rivet 17 in place of the bolt 18 and nut 15 of figure 7.

Referring to figures 9 and 10 the detailed configuration of the moveable handle 3 can be seen. In particular the lateral extension 13 which acts both as an operating handle to enable the moveable handle to be levered out from the fixed handle and also as an engaging member for the blades 5 and 6 during the return of the blades and moveable handle to the non-operating position back in the fixed handle 2.

The moveable handle also comprises the arc shaped cut out 9 which determines the extent of rotation of the moveable handle 3 before it engages the blades 5, 6. The blades 5, 6 are engaged by the moveable handle when the ends 9a of the arc 9 act against the pin 8 of the concave blade 6. The angle of the arc will be such that sufficient angle of rotation is left after engagement of the blades to rotate them the required 180 degrees to the operating position. At this position the movable handle will then need to be at the most desirable angle to act as a handle to operate the opening and closing of the blades in the cutting action. This angle is preferably 50 degrees but could be anywhere between 20 and 80 degrees. Thus the angle of the arc-shaped slot 9 corresponding to the angle of pivot of the moveable handle before engagement of the blades is preferably 130 degrees but could be within the range 100 to 160 degrees.

It will be appreciated that the invention provides a pair of secateurs which is easy to carry in ones pocket and which is a simple and effective mechanism which is also relatively sturdy and may allow cutting of significantly large branches.

The invention is not limited to the embodiments illustrated. For example it is envisaged that any other types of hand tools and cutting implements may be designed based on the principle of the invention. The person skilled in the art will realise that a pair of household/garden shears, a pair of nail clippers or alternatively a pair of pliers could be constructed in accordance with the mechanism of the invention. It will be appreciated that there is a wide range of applications for the invention.

Claims

1. A hand tool having a fixed handle 2 which houses first and second blades 5, 6 and a movable handle 3 all pivotally connected about a common axis 4, the blades 5, 6 and moveable handle 3 being interconnected so that rotation of the moveable handle in a first direction causes the blades 5, 6 to rotate out of the fixed handle 2 to an operating position, characterised in that further rotation of the moveable handle 3 in the same first direction causes an opening and closing action of the blades 5, 6.

2. A hand tool, said hand tool being a cutting implement, having a fixed handle 2 which houses first and second blades 5, 6, said first and second blades 5, 6 being movable with respect to each other and crossing each other in a cutting action, and a movable handle 3 all pivotally connected about a common axis 4, the blades 5, 6 and moveable handle 3 being interconnected so that rotation of the moveable handle in a first direction causes the blades 5, 6 to rotate out of the fixed handle 2 to an operating position, characterised in that further rotation of the moveable handle 3 in the same first direction causes a cutting action of the blades 5, 6.

3. A hand tool according to claim 1 or 2, characterised in that the moveable handle 3 is rotated by at least 90 degrees before the blades are engaged and subsequently pivoted from the fixed handle by further rotation of the movable handle.

4. A hand tool according to claim 1 or claim 2, characterised in that the movable handle has an arc shaped cut-out 9 engaging projecting a pin 8 at least one of the blades 5, 6 to permit pivoting movement of the moveable handle with respect to the blades.

5. A hand tool according to claim 3, characterised in that after the moveable handle 3 has been pivoted out of the fixed handle 2, the end 9a of the arc shaped cut-out 9 engages the pin 8 causing further rotational movement of the moveable handle 3 to result in corresponding pivoting of the blades our of the fixed handle 2.

6. A hand tool according to any one of the preceding claims, characterised in that, the hand tool includes at least one leaf spring 11, 11a to assist in urging of one of the blades 5, 6 into the operating position in which the said one of the blades 5, 6 is fixed with respect to the fixed handle 2 in a detented action.

7. A hand tool according to claim 6, characterised in that the first blades is urged into a fixed operating position by the leaf spring 11a by means of a cam surface 12 on the first blade 5 co-operating with the corresponding surface of the leaf spring 11a.

8. A hand tool according to claim 6 characterised in that the second blade 6 is movable in the operating position with respect to the first blade 5 between open and closed positions by the operation of the user of the moveable handle 3 and a leaf spring 11 urges said second blade 6 into the open position.

9. A hand tool according to any one of the preceding claims, characterised in that the second blade 6 comprises the pin 8 and the first blade 5 comprises an elongate slot 7 which limits the movement of the second blade in the open position.

10. A hand tool according to claims 1 or 2, character-

ised in that the blades 5,6 may be returned to a non operating position inside the fixed housing 2 by rotation of the moveable handle 3 in a second direction being opposite to said first direction.

11. A hand tool according to claim 10, characterised in that on return of the blades inside the housing 2, the moveable handle 3 comprises a lateral extension 13 to engage the blades 5, 6.

12. A hand tool according to claim 10, characterised in that the leaf spring 11a urges the first blade 5 into the non-operating position inside the fixed handle.

13. A hand tool according to claim 10, characterised in that the leaf spring 11 urges the second blade 6 into the non-operating position inside the handle.

14. A hand tool according to any one of the preceding claims, characterised in that in the non-operating position the movable handle 3 fits into the fixed handle 2 such that the lateral extension 13 may easily be gripped for the pivoting out of the moveable handle 3 from the fixed handle 2.

15. A hand tool according to any one of the preceding claims characterised in that the first blade 5 is urged into the fixed operating position by means of a torsion spring.

16. A hand tool according to any one of the preceding claims characterised in the second blade 6 is urged into the open position by means of a torsion spring.

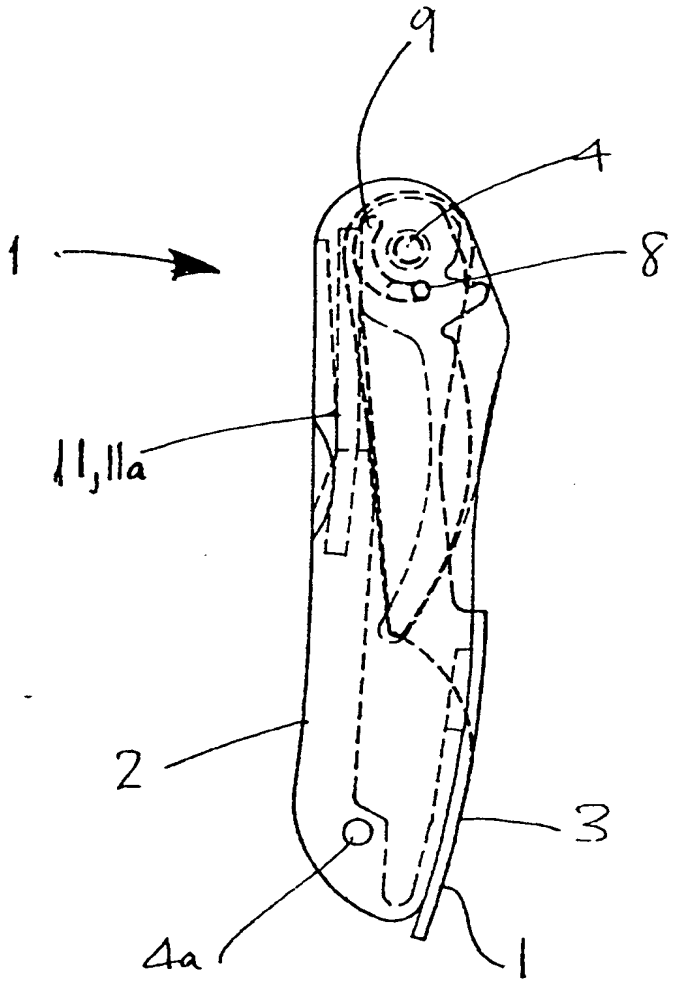

FIG 1

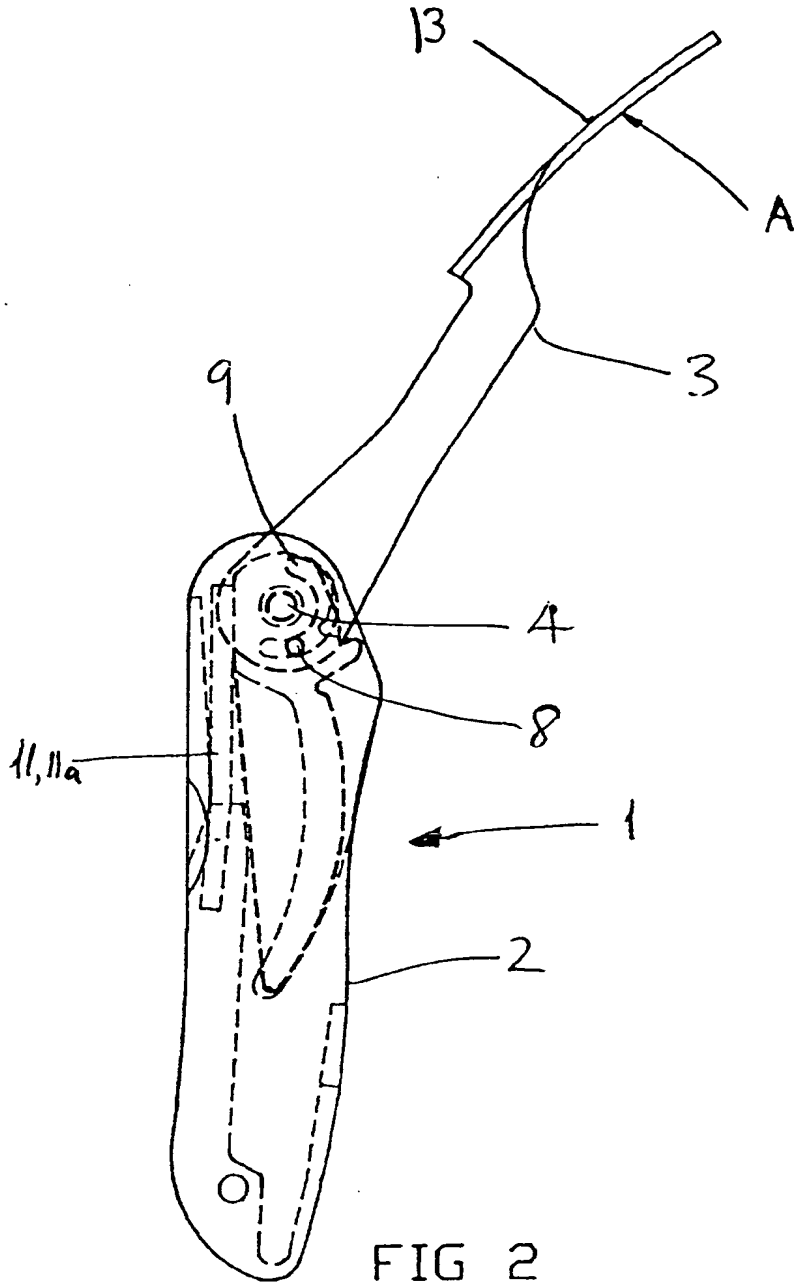

FIG 2

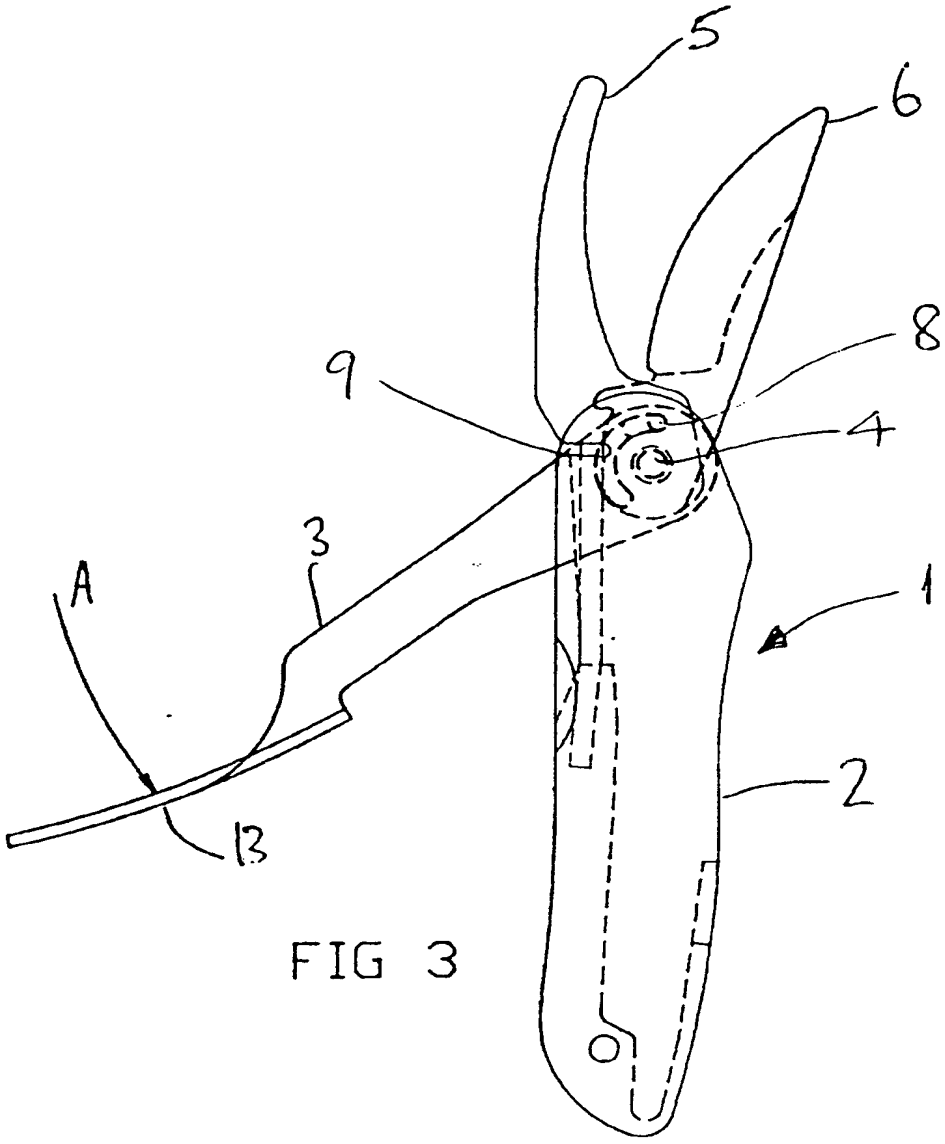

FIG 3

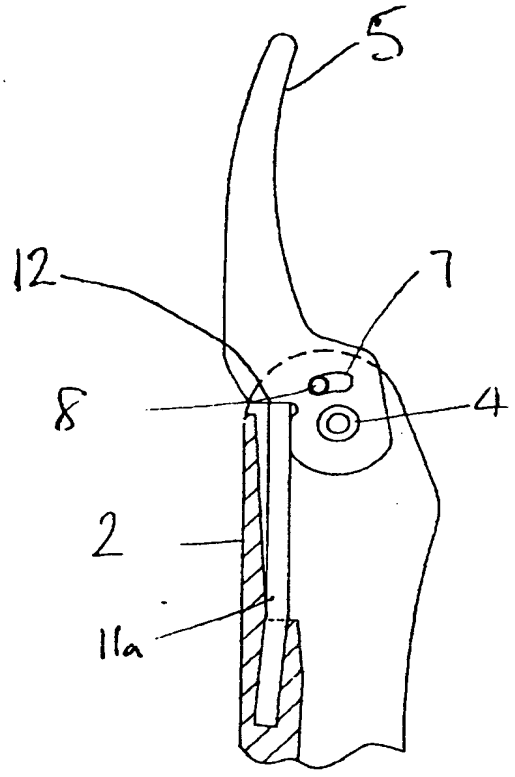

FIG. 4

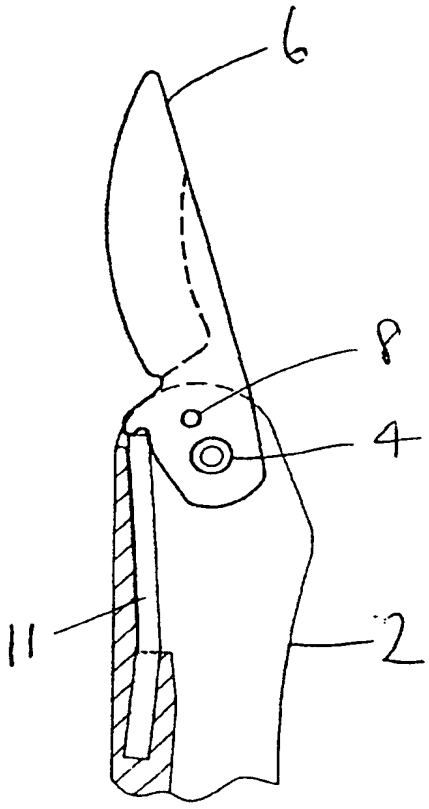

FIG. 5

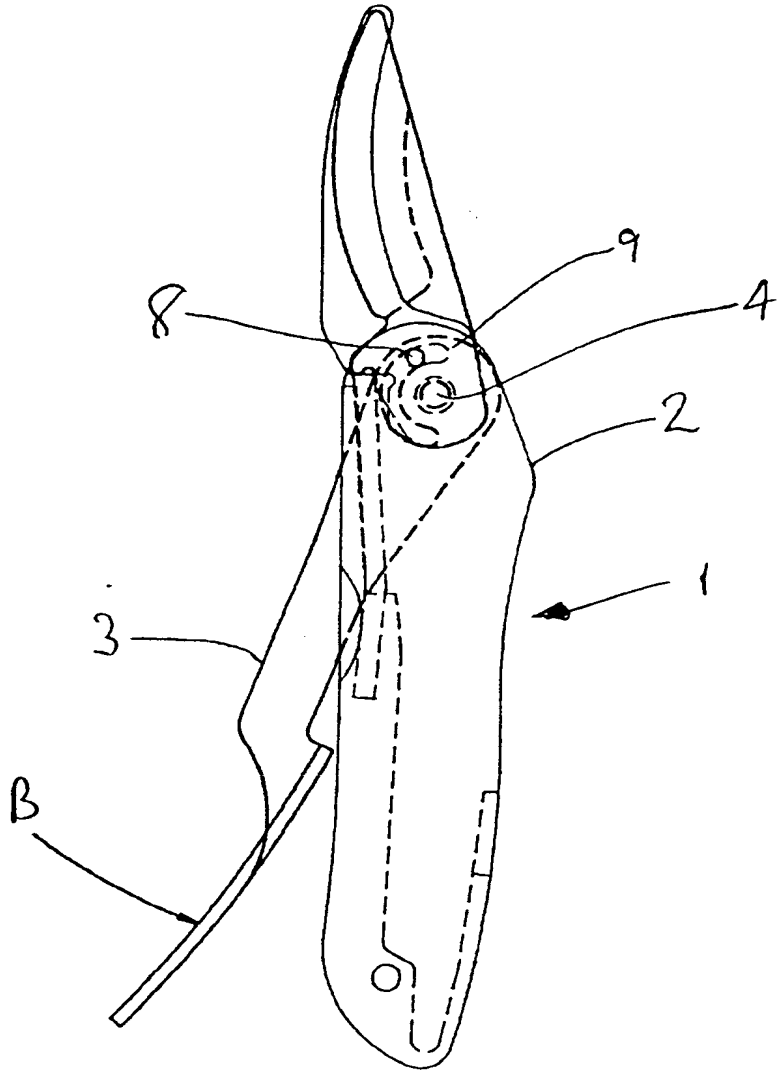

FIG 6

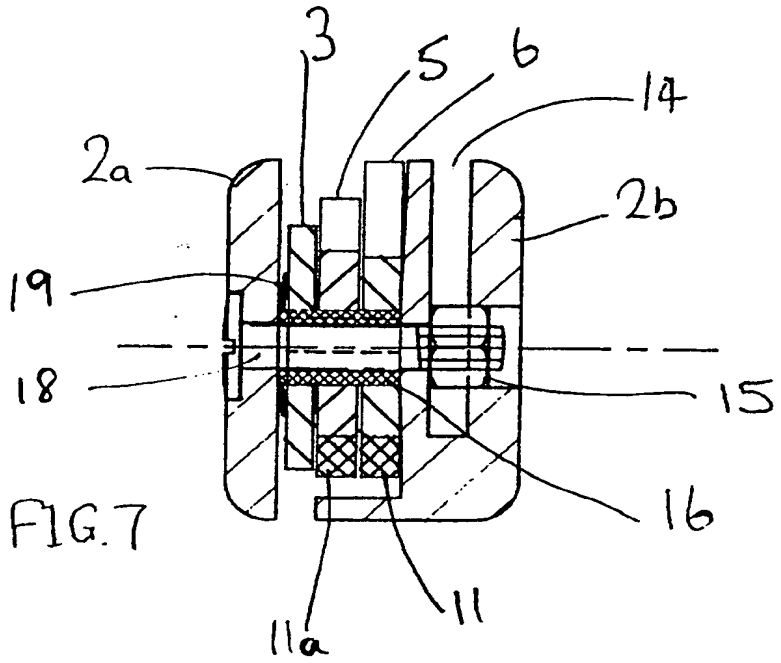

FIG.7

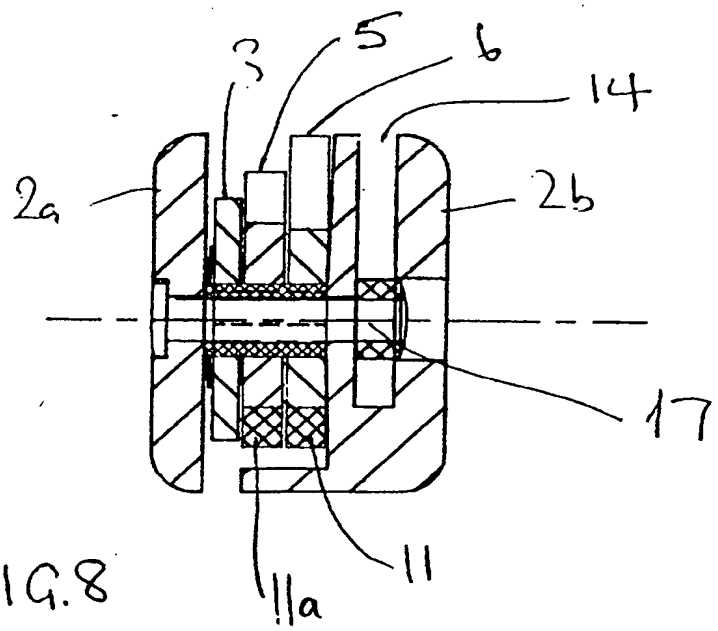

FIG.8

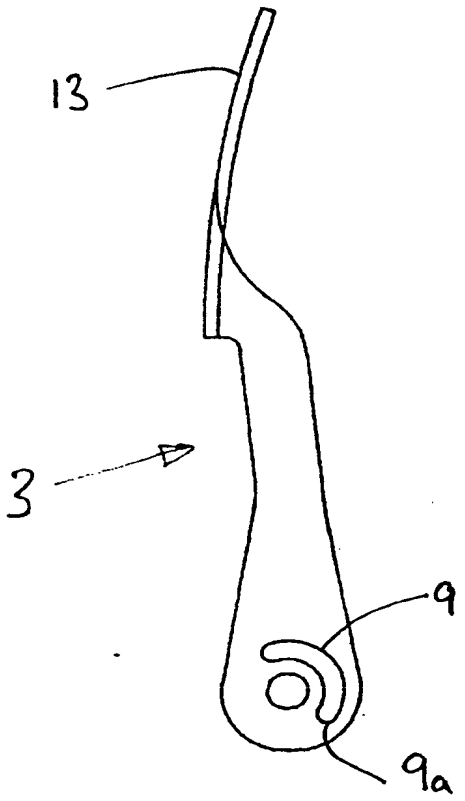

Fig. 9

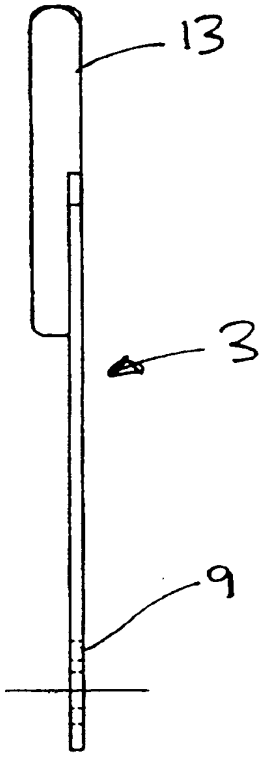

Fig. 10

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 30 8447

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	FR-A-581 903 (P MA) 8 December 1924 * the whole document *	1-3	B26B13/00
A	DE-C-23 695 (BÖNTGEN & SABIN) 5 September 1882 * the whole document *	1,2	
A	FR-A-654 286 (RÉMY & JONES) 4 April 1929		
A	FR-A-2 518 005 (AOKI TAKAAKI) 17 June 1983		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B26B
A01G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 March 1996	Wohlrapp, R

CATEGORY OF CITED DOCUMENTS

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